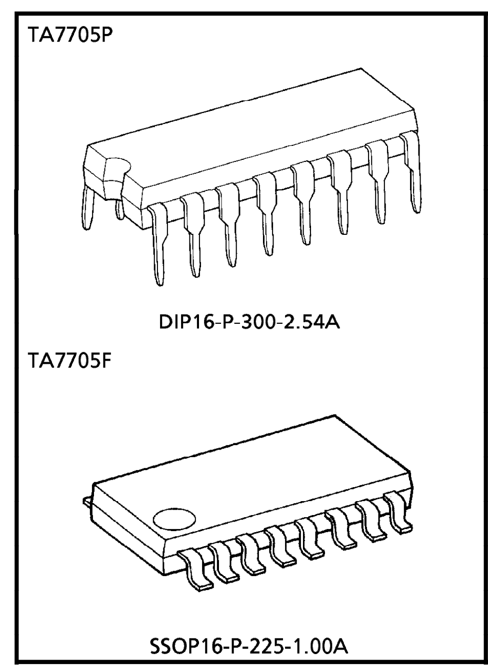
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA7705P, TA7705F

LOW NOISE DUAL AMPLIFIER FOR AUTOREVERSE CAR STEREO

TA7705P (DIP), TA7705F (SSOP) are dual preamplifier. These ICs contain dual amplifier, forward / reverse control switches and metal / normal tape equalizer control switches.



Weight
DIP16-P-300-2.54A : 1.0g (Typ.)
SSOP16-P-225-1.00A : 0.14g (Typ.)

FEATURES

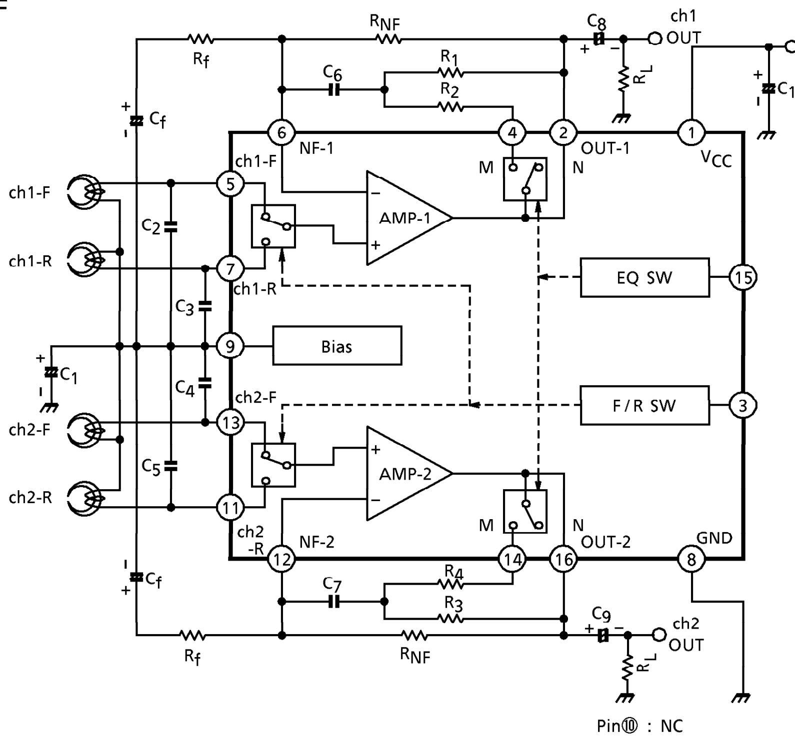
- High Open Loop Voltage Gain
  : G_{VO} = 98dB (Typ.) (V_{CC} = 9V, f = 1kHz)
- No Input Coupling Capacitor
- Low Distortion
  : THD = 0.035% (Typ.) (G_V = 40dB, V_{OUT} = 0.5V_{rms})
- Low Noise (Equivalent Input Noise Voltage)
  : V_{NI} = 0.9μV_{rms} (Typ.)
  (R_g = 620Ω, BW = 20Hz~20kHz, NAB EQ)
- Operating Supply Voltage Range
  : $V_{CC\,(opr.)}$ = 6~16V

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BLOCK DIAGRAM

TA7705P, TA7705F



APPLICATION INFORMATION

1. Forward / Reverse select switch

(1) Threshold voltage

Pin③ is coupled to the base of Q_1 (PNP-Tr) as shown Fig.1.
Threshold voltage (③pin) = 0.7V

Reverse	0~0.5V
Forward	1.0~V_{CC}

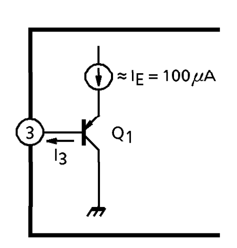


Fig.1

(2) The recommended Forward / Reverse select circuit is shown in Fig.2.

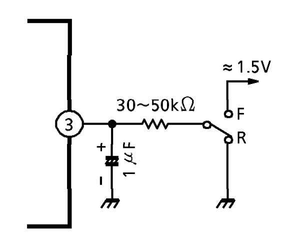


Fig.2

(3) I_3 (In Fig.1)

$I_3 = 12\mu A$ (Max., Ta = 25°C)

2. Equalizer control switch

Pin⑮ is coupled to the base of Q_2 (PNP-Tr) as shown in Fig.3.
The emitter potential of Q_2 is 3.9V. (DC)
Threshold voltage (15 pin) = 2.8V

Metal	3.2~16V
Normal	0~2.4V

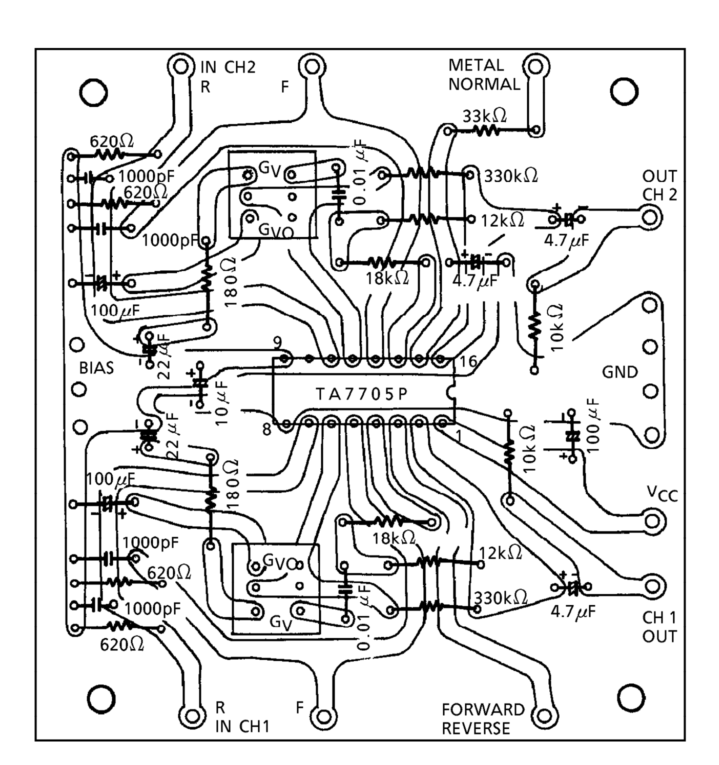
≈3.9V
15
Q_2

Fig.3

3. $C_{2\sim5}$

Capacitor C_2~C_5 may be required for preventing a instability caused by the pattern layout or interference of external high frequency signal.

STANDARD PRINT PATTERN
TA7705P



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	16	V
Power Dissipation	TA7705P	P_D (Note)	750	mW
	TA7705F		350	
Operating Temperature		T_{opr}	−30~75	°C
Storage Temperature		T_{stg}	−55~150	°C

(Note) Derated above Ta = 25°C in the proportion of 6mW / °C for TA7705P, and of 2.8mW / °C for TA7705F.

ELECTRICAL CHARACTERISTICS
(Unless otherwise specified, V_{CC} = 9V, f = 1kHz, R_L = 10kΩ, R_g = 600Ω, Ta = 25°C, Normal EQ)

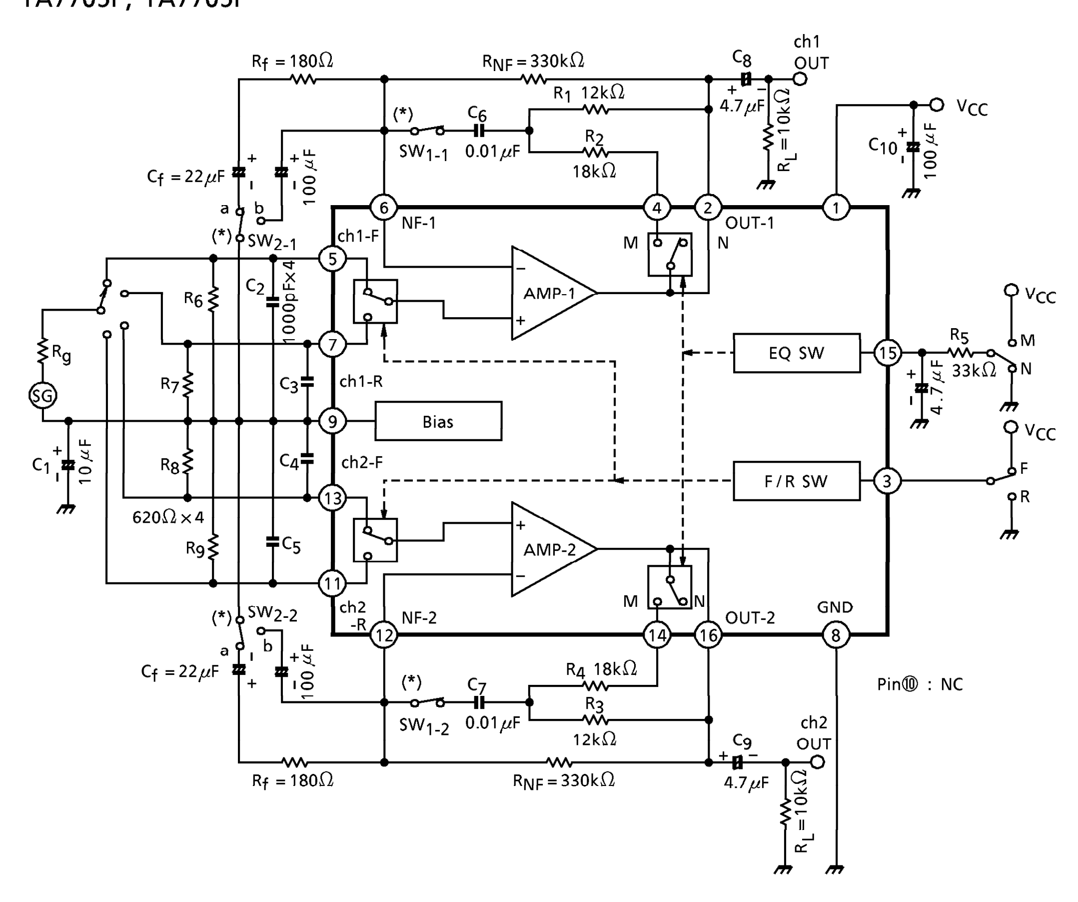
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current	$I_{CCQ (1)}$	—	V_{IN} = 0, Normal EQ	—	5.0	—	mA
	$I_{CCQ (2)}$	—	V_{IN} = 0, Metal EQ	—	6.0	9.0	
Open Loop Voltage Gain	G_{VO}	—	C_f = 100μF, R_f = 0	—	98	—	dB
Maximum Output Voltage	V_{OM}	—	THD = 0.5%	1.5	2.0	—	V_{rms}
Total Harmonic Distortion	THD	—	V_{OUT} = 0.5V_{rms}	—	0.035	0.12	%
Equivalent Input Noise Voltage	V_{IN}	—	R_g = 620Ω, NAB BW = 20Hz~20kHz	—	0.9	1.7	μV_{rms}
Input Resistance	R_{IN}	—	—	—	500	—	kΩ
Ripple Rejection	R.R.	—	f_{ripple} = 100Hz, V_{IN} = 1V_{rms}	—	55	—	dB
Cross Talk	C.T.	—	V_{OUT} = 0.775V_{rms} (0dBm)	50	60	—	dB
Forward / Reverse Cross Talk	C.T. (F / R)	—	V_{OUT} = 0.775V_{rms} (0dBm)	60	70	—	dB

TYP. DC VOLTAGE OF EACH TERMINAL
(V_{CC} = 9V, Ta = 25°C, Dual mode test circuit)

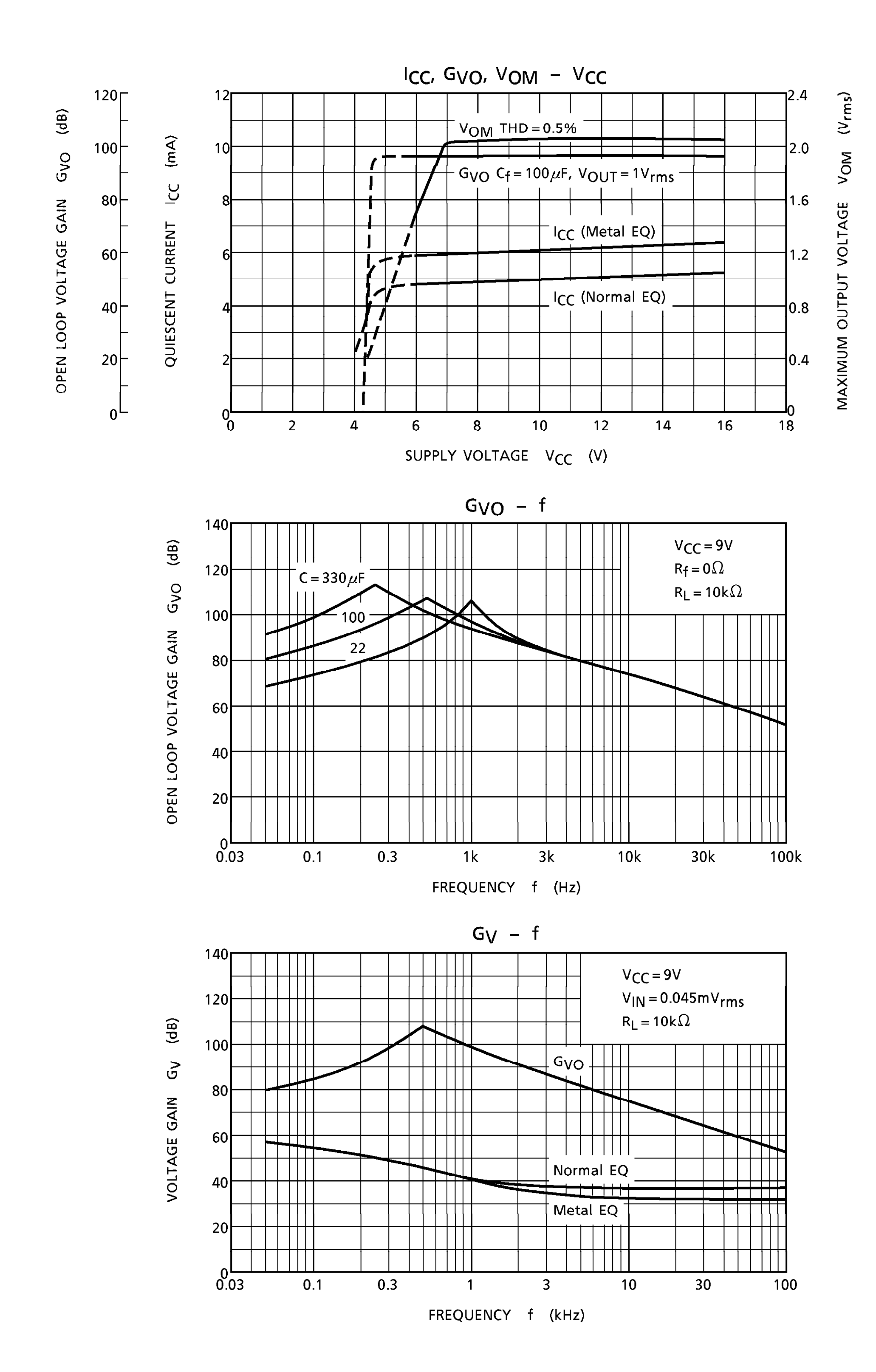
TERMINAL No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DC-Voltage (V)	V_{CC}	3.0	0.7	2.9	2.9	2.9	2.9	GND	2.9	NC	2.9	2.9	2.9	2.9	3.5	2.9

TEST CIRCUIT

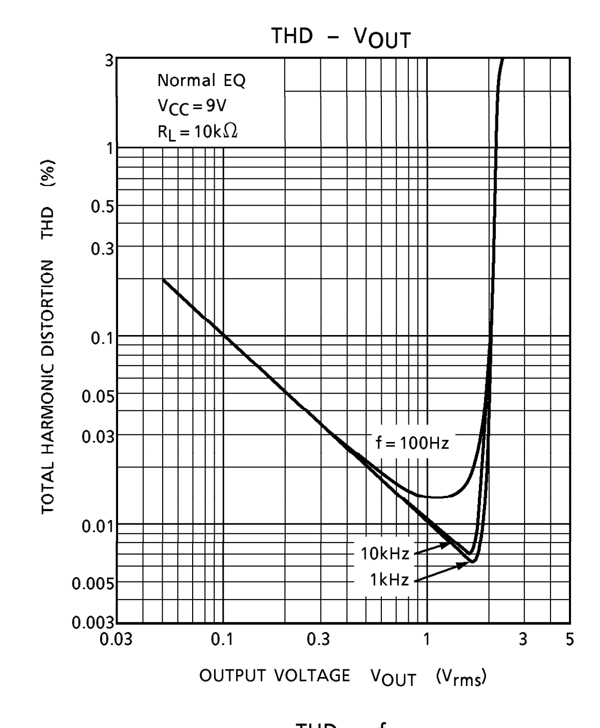
TA7705P, TA7705F

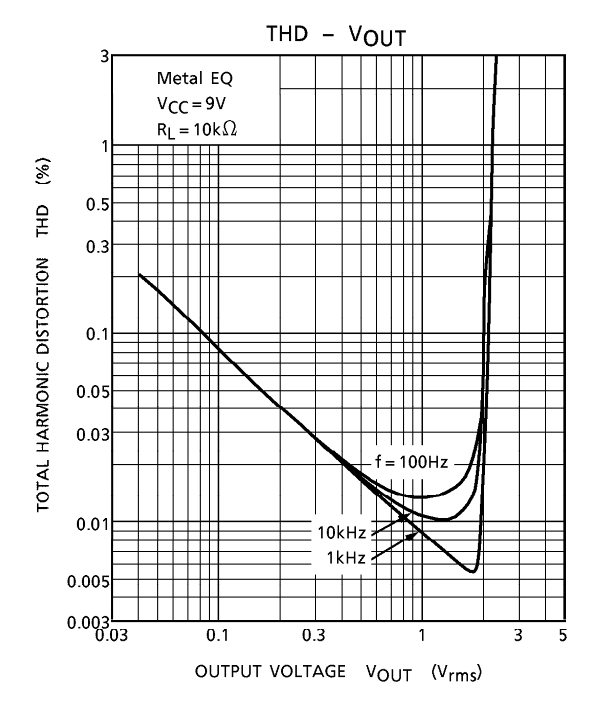


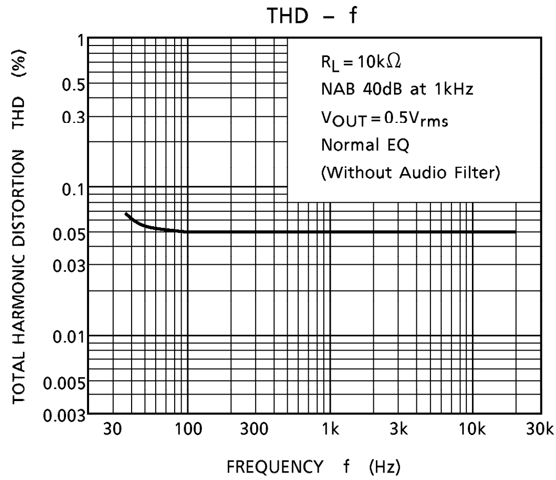
(*) G_{VO} Test : $SW_{1\text{-}1,\ 2}$ = OFF, $SW_{2\text{-}1,\ 2}$ = b

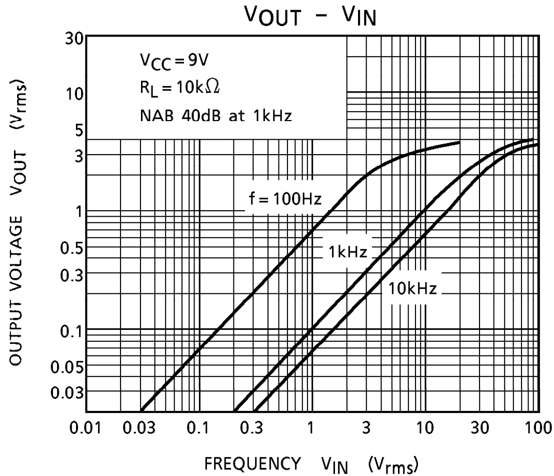


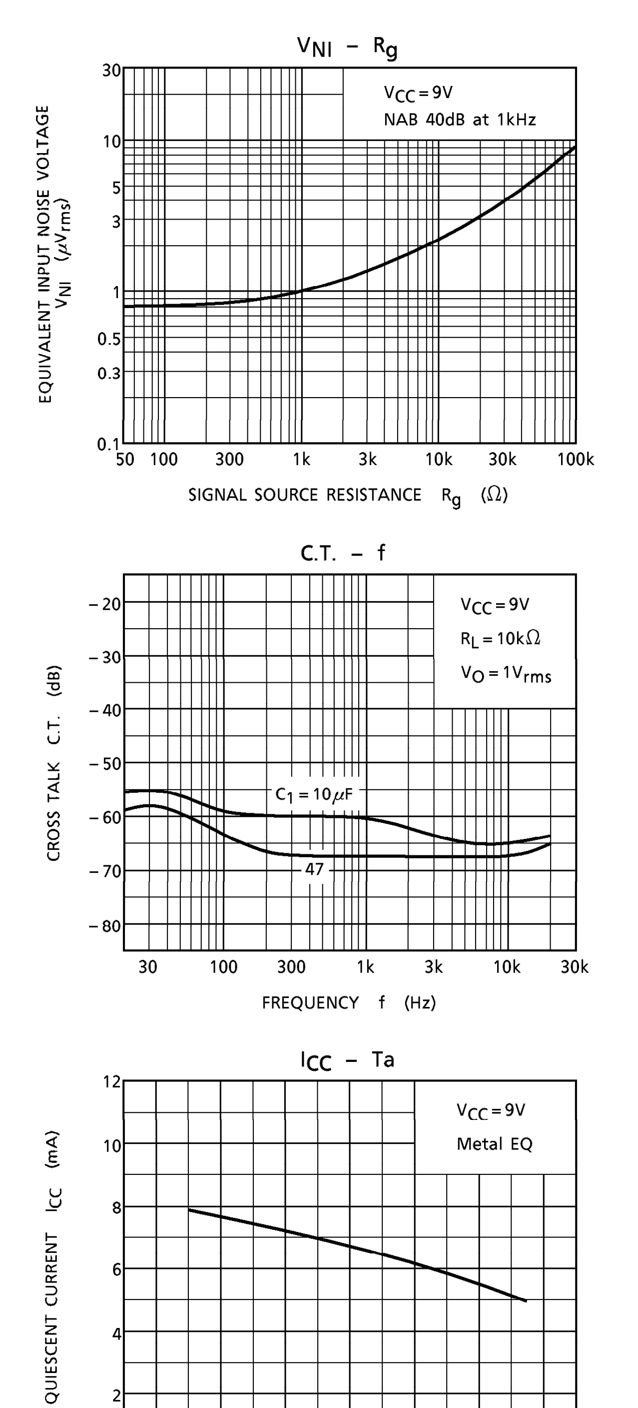
I_{CC}, G_{VO}, V_{OM} – V_{CC}
OPEN LOOP VOLTAGE GAIN G_{VO} (dB)
QUIESCENT CURRENT I_{CC} (mA)
MAXIMUM OUTPUT VOLTAGE V_{OM} (V_{rms})
V_{OM} THD = 0.5%
G_{VO} C_f = 100μF, V_{OUT} = 1V_{rms}
I_{CC} (Metal EQ)
I_{CC} (Normal EQ)
SUPPLY VOLTAGE V_{CC} (V)
G_{VO} – f
OPEN LOOP VOLTAGE GAIN G_{VO} (dB)
V_{CC} = 9V
R_f = 0Ω
R_L = 10kΩ
C = 330μF
100
22
FREQUENCY f (Hz)
G_V – f
VOLTAGE GAIN G_V (dB)
V_{CC} = 9V
V_{IN} = 0.045mV_{rms}
R_L = 10kΩ
G_{VO}
Normal EQ
Metal EQ
FREQUENCY f (kHz)


THD – V_{OUT}
Normal EQ
V_{CC} = 9V
R_L = 10kΩ
f = 100Hz
10kHz
1kHz
TOTAL HARMONIC DISTORTION THD (%)
OUTPUT VOLTAGE V_{OUT} (V_{rms})
3
1
0.5
0.3
0.1
0.05
0.03
0.01
0.005
0.003
0.03
0.1
0.3
1
3
5

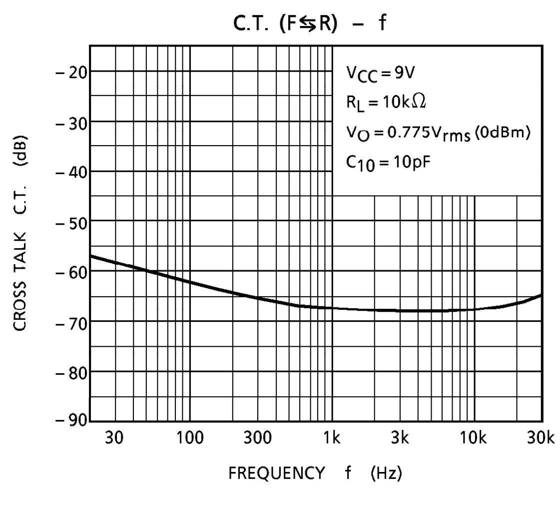

THD – V_{OUT}
Metal EQ
V_{CC} = 9V
R_L = 10kΩ
f = 100Hz
10kHz
1kHz
TOTAL HARMONIC DISTORTION THD (%)
OUTPUT VOLTAGE V_{OUT} (V_{rms})
3
1
0.5
0.3
0.1
0.05
0.03
0.01
0.005
0.003
0.03
0.1
0.3
1
3
5


THD – f
R_L = 10kΩ
NAB 40dB at 1kHz
V_{OUT} = 0.5V_{rms}
Normal EQ
(Without Audio Filter)
TOTAL HARMONIC DISTORTION THD (%)
FREQUENCY f (Hz)
1
0.5
0.3
0.1
0.05
0.03
0.01
0.005
0.003
30
100
300
1k
3k
10k
30k

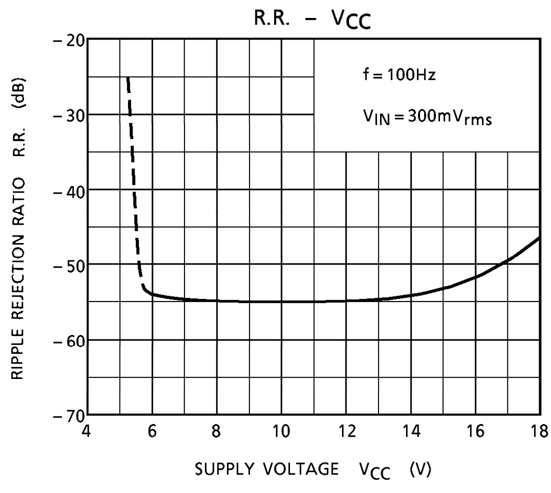

V_{OUT} – V_{IN}
V_{CC} = 9V
R_L = 10kΩ
NAB 40dB at 1kHz
f = 100Hz
1kHz
10kHz
OUTPUT VOLTAGE V_{OUT} (V_{rms})
FREQUENCY V_{IN} (V_{rms})
30
10
5
3
1
0.5
0.3
0.1
0.05
0.03
0.01
0.03
0.1
0.3
1
3
10
30
100



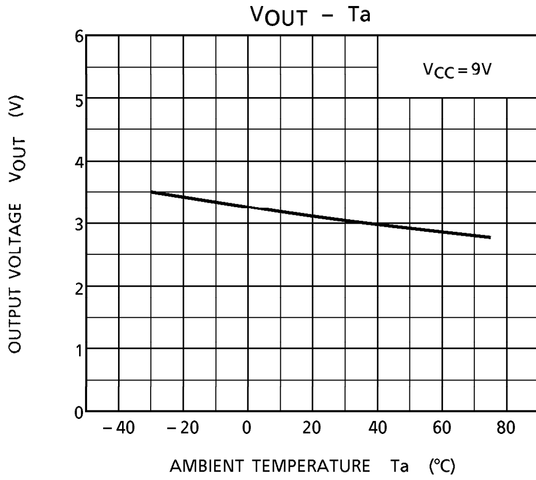
V_NI – Rg
VCC = 9V
NAB 40dB at 1kHz
EQUIVALENT INPUT NOISE VOLTAGE V_NI (μVrms)
30
10
5
3
1
0.5
0.3
0.1
50 100 300 1k 3k 10k 30k 100k
SIGNAL SOURCE RESISTANCE Rg (Ω)
C.T. – f
VCC = 9V
RL = 10kΩ
VO = 1Vrms
C1 = 10μF
47
CROSS TALK C.T. (dB)
–20
–30
–40
–50
–60
–70
–80
30 100 300 1k 3k 10k 30k
FREQUENCY f (Hz)
ICC – Ta
VCC = 9V
Metal EQ
QUIESCENT CURRENT ICC (mA)
12
10
8
6
4
2
0
–40 –20 0 20 40 60 80
AMBIENT TEMPERATURE Ta (°C)



C.T. (F⇆R) – f
VCC = 9V
RL = 10kΩ
VO = 0.775Vrms (0dBm)
C10 = 10pF
CROSS TALK C.T. (dB)
–20
–30
–40
–50
–60
–70
–80
–90
30 100 300 1k 3k 10k 30k
FREQUENCY f (Hz)



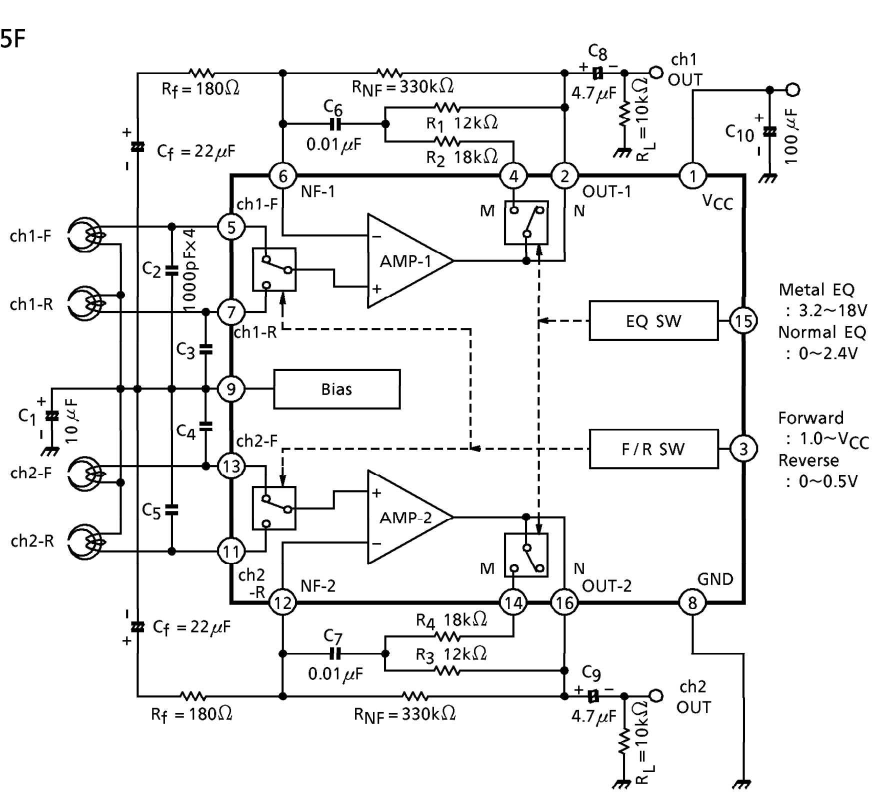
R.R. – VCC
f = 100Hz
VIN = 300mVrms
RIPPLE REJECTION RATIO R.R. (dB)
–20
–30
–40
–50
–60
–70
4 6 8 10 12 14 16 18
SUPPLY VOLTAGE VCC (V)



VOUT – Ta
VCC = 9V
OUTPUT VOLTAGE VOUT (V)
6
5
4
3
2
1
0
–40 –20 0 20 40 60 80
AMBIENT TEMPERATURE Ta (°C)

APPLICATION CIRCUIT

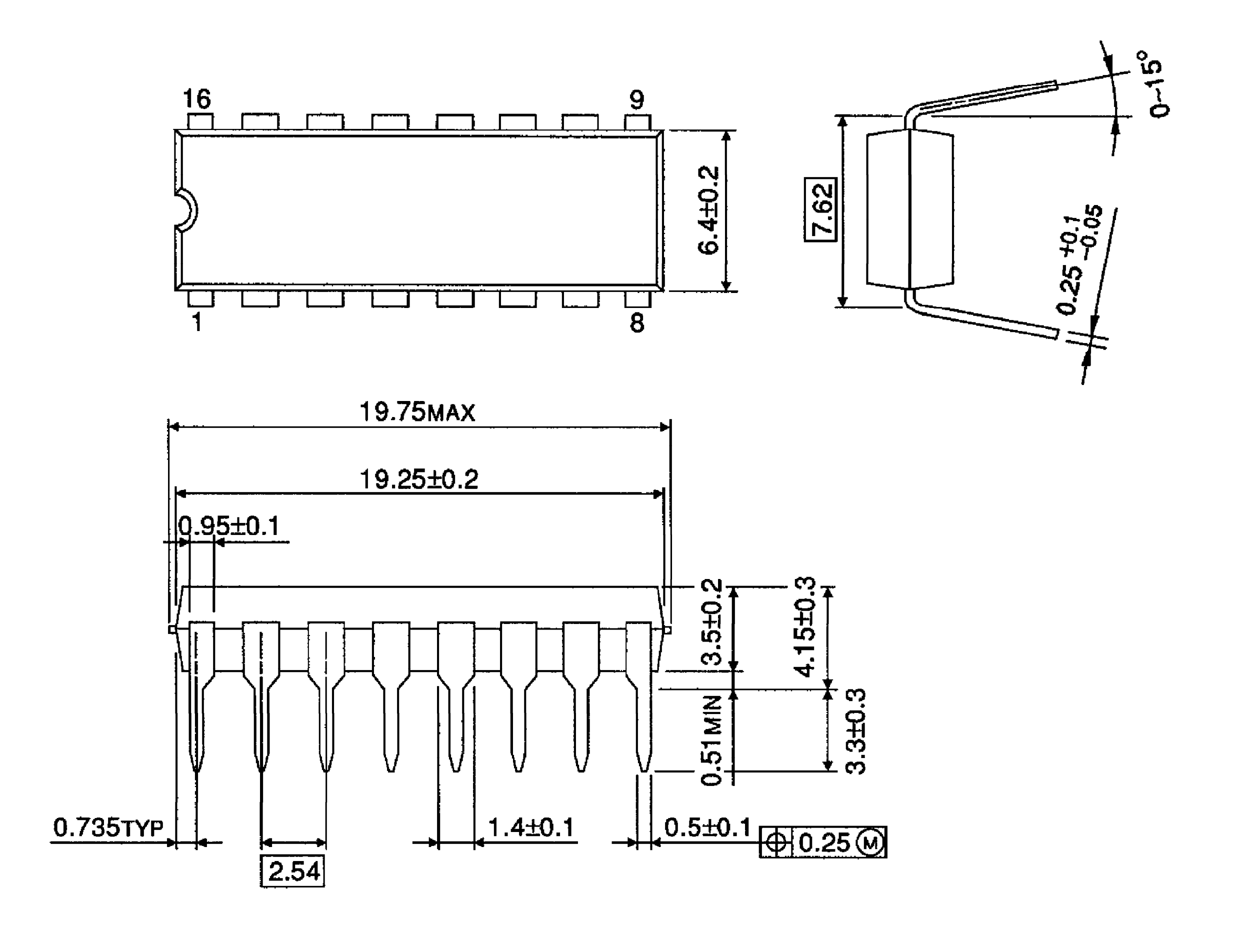
TA7705P, TA7705F



OUTLINE DRAWING

DIP16-P-300-2.54A

Unit : mm

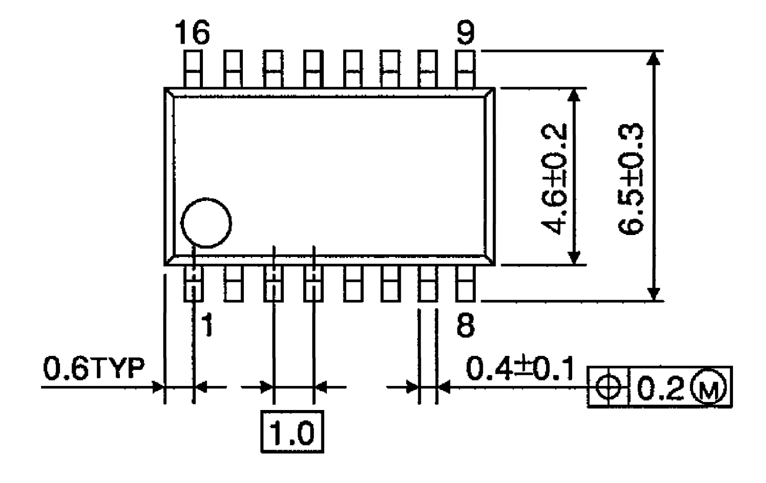


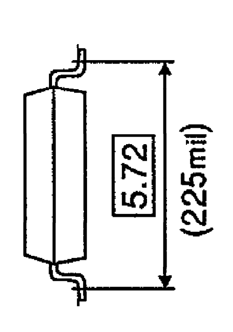
Weight : 1.0g (Typ.)

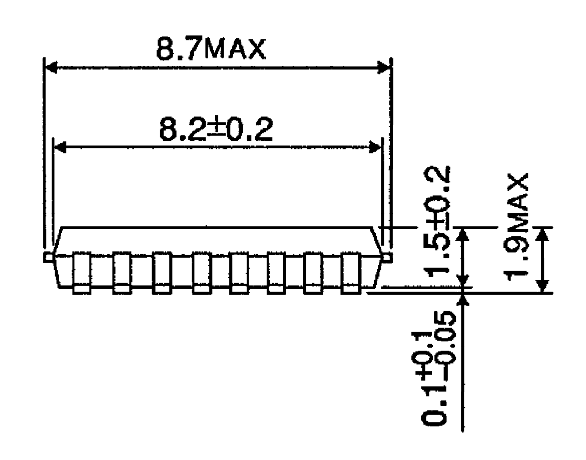
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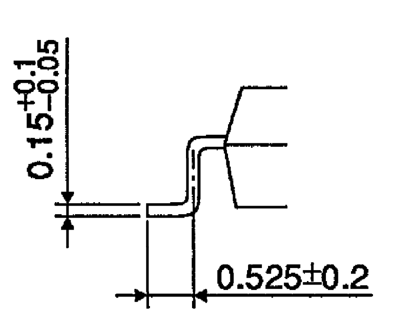
SSOP16-P-225-1.00A

Unit : mm









Weight : 0.14g (Typ.)